Y, CALIFORNIA 93943-5002

NAVAL POSTGRADUATE SCHOOL

Monterey, California

THESIS

K876602

MANAGING THE F-14 FLIGHT HOUR BUDGET IN AN ENVIRONMENT OF DECREASING FINANCIAL RESOURCES

by

Jeff C. Kuhnreich

September 1988

Thesis Advisor: Kenneth J. Euske

Approved for public release; distribution is unlimited

T242023

REPORT DOCUMENTATION PAGE

a REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b RESTRICTIVE MARKINGS
b SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution is unlimited
b DECLASSIFICATION DOWNGRADING SCHEDULE	
PERFORMING ORGANIZATION REPORT NUMBER(S)	5 MONITORING ORGANIZATION REPORT NUMBER(S)
a NAME OF PERFORMING ORGANIZATION aval Postgraduate School	6b OFFICE SYMBOL (If applicable) 54
7a NAME OF MONITORING ORGANIZATION Naval Postgraduate School	
c ADDRESS (City, State, and ZIP Code) onterey, California 93943-5000	7b ADDRESS (City, State, and ZIP Code) Monterey, California 93943-5000
a NAME OF FUNDING / SPONSORING ORGANIZATION	8b OFFICE SYMBOL (If applicable)
9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
c ADDRESS (City, State, and ZIP Code)	10 SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO	PROJECT NO	TASK NO	WORK UNIT ACCESSION NO

1 TITLE (Include Security Classification)
ANAGING THE F-14 FLIGHT HOUR BUDGET IN AN ENVIRONMENT OF DECREASING
INANCIAL RESOURCES

2 PERSONAL AUTHOR(S)
Kuhnreich, Jeff C.

3a TYPE OF REPORT	13b TIME COVERED FROM ____ TO ____	14 DATE OF REPORT (Year Month Day)	15 PAGE COUNT
aster's Thesis		1988 September	79

5 SUPPLEMENTARY NOTATION The views expressed in this thesis are those of the author
d do not reflect the official policy or position of the Department of Defense
r the U. S. Government.

7 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	F-14; Flight Hour Program; Budget

9 ABSTRACT (Continue on reverse if necessary and identify by block number)

This thesis examines the Flight Hour Program of the Commander, Naval Air orces Pacific Fleet in order to help develop alternate methods for tactical et squadrons to prepare for the budgetary constraints imposed due to the assage of the Gramm-Rudman-Hollings Act. An overview of the program as it ow functions is provided. Comments and perceptions of the future of the rogram gathered from interviews of individuals working with and under the rogram are also presented. The thesis examines methods of evaluating the rogram and discusses the program's effect on safety. Recommendations and uggestions for future study or examination are presented.

20 DISTRIBUTION / AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	UNCLASSIFIED
22a NAME OF RESPONSIBLE INDIVIDUAL Euske, Kenneth J.	22b TELEPHONE (Include Area Code) 408 646 2860
	22c OFFICE SYMBOL 54Ee

D FORM 1473, 84 MAR 83 APR edition may be used until exhausted
All other editions are obsolete

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

Approved for public release; distribution is unlimited

Managing the F-14 Flight Hour Budget in an Environment of Decreasing Financial Resources

by

Jeff C. Kuhnreich
Lieutenant Commander, United States Navy
B.A., Duke University, 1977

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
September 1988

ABSTRACT

This thesis examines the Flight Hour Program of the Commander, Naval Air Forces Pacific Fleet (CNAP) in order to help develop alternate methods for tactical jet squadrons to prepare for the budgetary constraints imposed due to the passage of the Gramm-Rudman-Hollings Act. An overview of the program as it now functions is provided. Comments and perceptions of the future of the program gathered from interviews of individuals working with and under the program are also presented. The thesis examines methods of evaluating the program and discusses the program's effect on safety. Recommendations and suggestions for future study or examination are presented.

TABLE OF CONTENTS

I. INTRODUCTION ---------- 1

A. BACKGROUND ---------- 1

B. POLICY AND BUDGET FORMULATION ISSUES -------- 2

C. BUDGET CUTS AND OPERATIONS ---------- 2

D. OBJECTIVES AND SCOPE ---------- 5

E. METHODOLOGY ---------- 6

F. CHAPTER OUTLINE ---------- 6

II. BACKGROUND ---------- 8

A. HOW THE PROGRAM DEVELOPED ---------- 8

B. THE FLIGHT HOUR PROGRAM ---------- 9

1. CNAL and CNAP Reaction to Congressional Fiscal Policy ---------- 12

2. CNAL and CNAP Differences ---------- 14

3. CNAP PMR Policy ---------- 16

4. Cost Per Hour Computations and Their Use ---------- 19

5. The OP-20 ---------- 20

C. SUMMARY ---------- 22

III. EFFECTIVENESS, EFFICIENCY AND SAFETY ---------- 24

A. EFFICIENCY, EFFECTIVENESS AND COST ---------- 24

1. Primary Mission(s) and Their Funding ---- 24

2. Congressional Requirements ---------- 26

3. Measuring the Flight Hour Program ------- 27

MONTEREY, CALIFORNIA 93943

4. The Best Measure, Effectiveness or Efficiency ---------- 28

5. The Budget as a Given and Its Result ---- 30

B. READINESS AND ITS MEASURE ---------- 31

1. Status of Resources and Training Systems ---------- 31

C. EFFECTIVENESS, EFFICIENCY AND READINESS ----- 32

1. Is Every Hour Like the Next? ---------- 32

D. SAFETY CONSIDERATIONS ---------- 33

IV. OPERATORS, MANAGERS AND PROBLEMS DISCUSSED ------ 41

A. THE MILITARY OPERATION ENVIRONMENT DISCUSSED ---------- 42

B. THE CONDUCT OF THE INTERVIEWS ---------- 43

C. A REVIEW OF GENERAL NAVAL AVIATION CONCERNS - 43

1. Cost Per Hour or Costs Per Hour? -------- 43

2. Mission Loading ---------- 45

3. Simulators ---------- 46

4. Safety and Operational Needs ---------- 48

D. FLIGHT HOUR PROGRAM ISSUES ADDRESSED BY CNAP ---------- 49

E. SENIOR OFFICER DISCUSSIONS ---------- 53

1. A Review of Specific Suggestions -------- 53

F. SUMMARY ---------- 57

V. CONCLUSIONS ---------- 58

A. GENERAL COMMENTS ---------- 58

B. OBSERVATIONS AND RECOMMENDATIONS ---------- 60

C. SUGGESTIONS FOR FURTHER RESEARCH ---------- 63

APPENDIX: THE FIGHTER TRAINING MATRIX ---------- 64

LIST OF REFERENCES ---------- 67

BIBLIOGRAPHY ---------- 70

INITIAL DISTRIBUTION LIST ---------- 71

I. INTRODUCTION

A. BACKGROUND

The Department of the Navy Programming Manual describes a budget as:

> A planned program for a fiscal period in terms of (a) estimated costs, obligations, and expenditures, and (b) source of funds for financing, including reimbursements anticipated, and other resources implied. [Practical Comptrollership Manual, 1987]

This thesis looks at how the Tactical Air (TACAIR) community in the Pacific theatre has worked under the present system of flight hour funding and the problems the community projects in attempting to provide both the combat readiness and cost effectiveness that the nation needs in the future under this system.

Providing the myriad of resources, including aircraft, personnel, fuel, and parts required for the nation's desired level of operational readiness presents a highly complex and difficult managerial problem. The Navy's Flight Hour Program (FHP), is used to manage the Naval Air Force's budget request for its part of Operations and Maintenance, Navy (O&M,N) funds. These funds provide the daily operating dollars for the Navy's overall readiness level. The Flight Hour Program specifically deals with the line items Operating Target (OPTAR) Functional Categories.

B. POLICY AND BUDGET FORMULATION ISSUES

Funds are programmed and flight hour policy is formulated by the Office of the Flight Hour Program Manager (OP-05E) for the Chief of Naval Operations (CNO, OPNAV). At the Type Commander level, Commander Naval Air Force Atlantic Fleet (CNAL) and Commander Naval Air Force Pacific Fleet (CNAP), the program is managed by the Air Operations department (Code 30) and a branch of the Comptroller department (Code 019). [McDonnell, February 1988] Individual squadrons manage the funds provided through these organizations at a local level. Each organizational level is responsible for the degree of professionalism with which it manages the funds received and executes its mission directives. [McDonnell, February 1988]

Congress bases its decisions for the funding levels of the various segments of the Navy's budget upon the requests of the department balanced against the Congress' perceptions of the needs of the country. [Mills and Palmer, 1983] The flow of funds is depicted on Figure 1-1 which shows the Department of the Navy's (DoN) fiscal chain of command through the Fleet commanders to the Type commanders down to the Squadron commanders.

C. BUDGET CUTS AND OPERATIONS

At the conclusion of the Viet Nam War, Congress cut the operating budget for the Navy and its Air Force for the remainder of the 1970's. These cuts reduced the operating

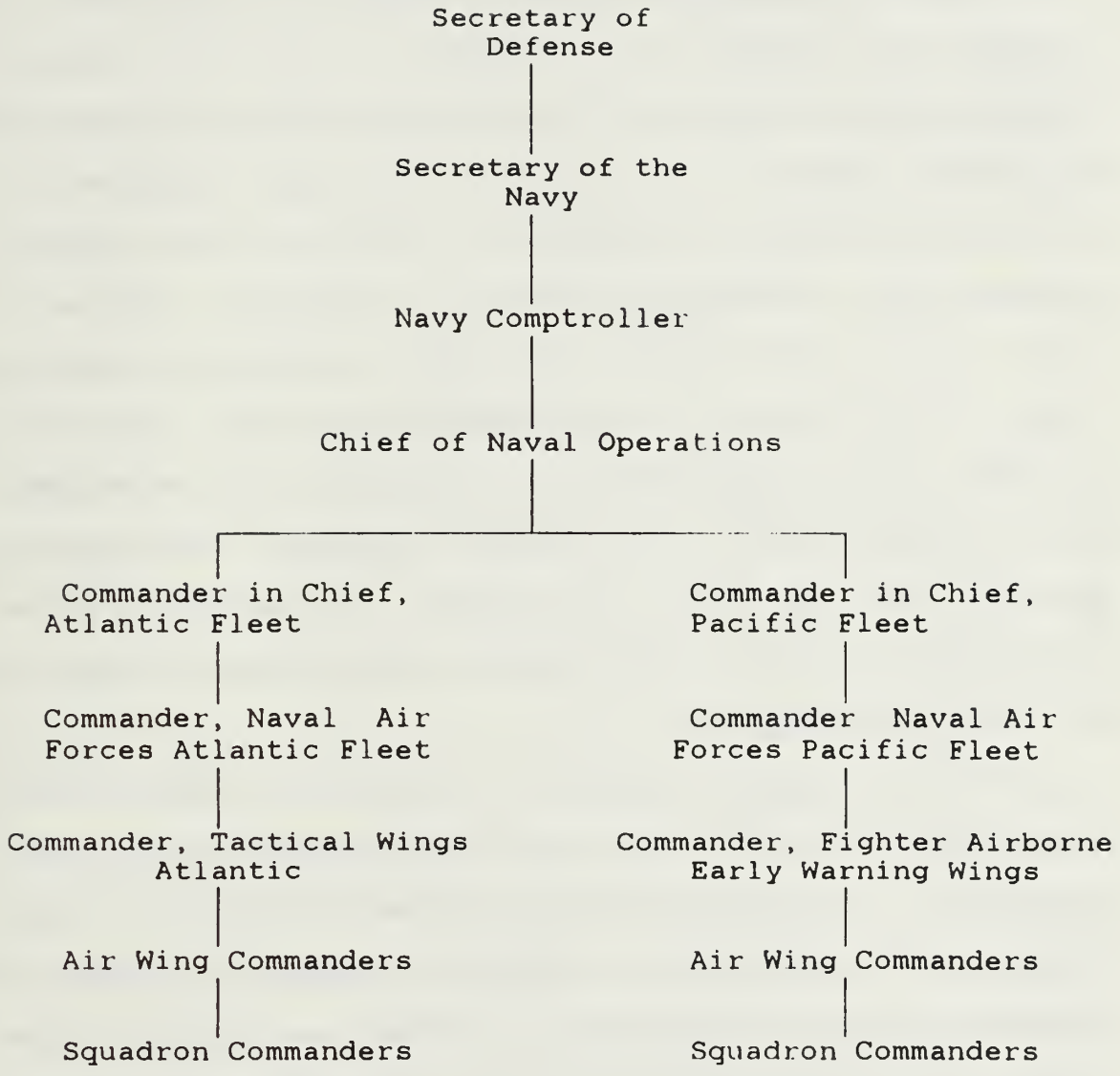


Figure 1-1 Organization for Funds Flow for O&M,N Appropriations for USN Fighter Squadrons

funds for the Navy. However, global operating commitments were not similarly reduced. [CNAP 019, 1988] In addition, severe increases in the cost of fuel and associated petroleum products exacerbated the funding problem and cut back further the ability of the Navy to perform its mission.

In 1986, a fiscally conservative policy was initiated by Congress and funding for Commander, Naval Air Forces, Pacific Fleet (CNAP) Tactical Aviation (TACAIR) squadrons was reduced from its 1985 level of 150.8 million dollars to 135 million dollars. [McDonnell, February 1988] Budget planners for the Navy anticipate a continuing decline in actual dollars for the next few years. [Waggoner, February 1988] The Navy must once again address a funding constraint problem. Having experienced the cutbacks of the seventies, the Navy must tune its present readiness and training programs to be able to accept the future funding constraints. For Naval Air Forces, the program affected is the Flight Hour Program.

One of the primary goals of the Navy is readiness and the ultimate goal of the Flight Hour Program is the same. However, it is an open question whether this system in its present form provides a sufficient means for assuring adequate warfare capability to TACAIR squadrons either through its funding procedure or its method of determining flying hour requirements for the fleet.

D. OBJECTIVES AND SCOPE

This thesis examines the Flight Hour Program, evaluates its planning, funding, and execution, presents specific program modifications, and provides a list of areas within the program that would benefit from further research.

The thesis considers potential problems resulting from the system which the Navy uses to provide training to accomplish its aviation missions. Results of interviews with Fighter Squadron personnel and current and former Commanding Officers are also presented. The results of the interviews provide proposed methods for dealing with anticipated operating cutbacks.

During the framing of this research, the original objective was to examine: 1) How the loss of flight hours had affected squadron operations? 2) How further cuts would affect them in the future? As perceived by the aviators interviewed, the scale down of funding has not yet affected their combat effectiveness. Financial policy at higher levels has, so far, maintained a steady flow of funds for required flight operations. It is at this higher level (CNAP) that the shifts in funding policy and the realization of potential readiness problems has occurred. Therefore, this level is given great consideration in this study.

Subsidiary research questions addressed in this thesis are: Does the Flight Hour Program adequately provide the required resources for combat effectiveness? Are the

requirements of the Flight Hour Program either understated or misstated because of a reliance on past funding levels? Are the funding levels adequate because of the advances in both technology and tactics?

E. METHODOLOGY

The primary source of information and data for this thesis was interviews with squadron level through Type Commander level personnel. Additional data were collected from periodicals, instructions, data files, and message traffic made available during those meetings. A list of references is provided at the end of the thesis.

Individuals within the Naval Aviation community were interviewed at N.A.S. Miramar, N.A.S North Island, and N.A.S. Lemoore, the Naval Postgraduate School, the Naval Aviation Safety School in Monterey, CA, and the office of the Deputy Chief of Naval Operations (Air Warfare) in Washington, D.C.

F. CHAPTER OUTLINE

This thesis is divided into five chapters.

Chapter I is an introduction to the issues faced by the TACAIR community.

Chapter II discusses in more detail the Flight Hour Program, the fiscal foundation of the Naval Air Force's readiness level.

Chapter III discusses problems associated with the program including discussions on efficiency versus effectiveness and safety considerations.

Chapter IV examines the recommendations of present and former squadron commanders and CNAP personnel towards fitting the Training and Readiness requirements to a smaller operating budget.

Chapter V presents observations and recommendations for managing the flight requirements of the Fighter community in the environment of decreasing funds.

II. BACKGROUND

This chapter reviews the process by which the Department of the Navy and the Naval Air Force Type Commanders (CNAP and CNAL) compute flight hour requirements and analyzes how the Flight Hour Program funds the fleet for both flight time and maintenance costs. CNAP and CNAL provide estimates of the total number of hours "required" for an aircrew to be operationally mission ready for each type, model and series (TMS) of aircraft to the office of the Chief of Naval Operations. These hours are then transformed into dollar amounts and presented for budget consideration. TMS maintenance costs are also computed on a "cost per hour" basis and included in the budget request. Once the budget is approved and the funds are made available to the Navy, the actual dollar amounts are compared to the amount requested. Adjustments are then made to the Flight Hour Program and reflected in adjustments to the Primary Mission Readiness (PMR) percentages assigned to each phase of a squadron's operational cycle. A more detailed explanation follows.

A. HOW THE PROGRAM DEVELOPED

Prior to the end of the Viet Nam war, flight hours were computed on the basis of Fundamental Mission Requirements (those hours required for specific warfare specialty

proficiency such as bombing, air to air gunnery and intercept training) and Supporting Mission Requirements (those hours flown in indirect support of specific mission requirements such as tanker, surface search and cross-country navigation flights). These hours were combined to form the Full Mission Readiness requirement.

After the end of the Viet Nam war, congressional budget policy forced cuts in the operating funds of the Navy and its flight hour program. Unplanned price rises for the cost of fuel aggravated the situation. Full mission readiness could not be maintained at the new funding levels. [CNAP, 1988] It was then determined that an acceptable level of readiness could be maintained if the support flying hours were dropped and the required flight hours could then be linked to those flown in the fundamental or "primary" mission area. [CNAP, 1988] Thus was born the Primary Mission Requirement (PMR) which is used to this day for funding the flight hour program.

B. THE FLIGHT HOUR PROGRAM

The Navy's Flight Hour Program is concerned with the planning, programming, budgeting and management of the annual flight hours for US Naval aircraft. The program is a statement of all requirements, budgeted hours, associated costs, fuel usage and readiness milestones for the forces. These factors are converted into a common denominator: dollars. The dollars are then divided between the two Type

Commanders and distributed between the various squadron types under their command. The CNAP flight hour program is divided into three separate categories of squadron types: Support, Fleet Replacement Squadrons (FRS), and TACAIR/ASW. Each category has unique requirements dictating three unique approaches to funding and flight hour allocation.

The Support category is unique in that it is composed of numerous subgroups under different operational chains of command (OPCON). Two examples include: Test and Evaluation squadrons (VX) that are directed through the office of CNO by the Operational Evaluation (OPEVAL) schedule and Amphibious force air assets which are tasked through COMPHIBGRUEASTPAC. [CNAP, 1987]

Funding and flight hour allocation for the Fleet Replacement Squadrons are the result of a series of computations performed by individuals through out the chain of command. Fleet Replacement Squadrons exist for each type of aircraft in the Navy's inventory. In some cases, there are two squadrons, one on the East coast and one on the West coast. The Fleet Replacement Squadrons are regulated by their Pilot Training Rate (PTR). The PTR is assigned by the TACAIR FRS Training Coordinator in the office of Deputy Chief of Naval Operations (Air Warfare) (OP-593C) in a tasking letter received by the squadrons each May for the subsequent fiscal year. [CNAP, 1987]

The number of pilots required is based on a projection of the number of pilot seats which will open due to cyclical rotation, accident losses, career changes, and sometimes the creation of new squadrons. Pilots going through the course for the first time are designated Category One. Those pilots with prior fleet experience may take an abbreviated course schedule or refresher training, and are designated Category II or higher and have a factor included for their previous experience. The number of Category II and higher pilots are converted into a Category I equivalent and added to the total of Category I pilots. This total is multiplied by the average number of hours that it takes to qualify a Category I in type which yields the total number of hours projected to train the requisite number of pilots. The average number of hours includes those hours flown for associated maintenance support. The total number of hours to train the pilots required is then funded at the cost per hour rate to arrive at the budget for the FRS. [CNAP, 1987; Lewis, March 1988]

The TACAIR/ASW Flight Hour Program relies on the PMR as its foundation for funding requests. The PMR is defined as the "ability of an aircrew to perform the primary mission of the assigned aircraft, to include all weather day and night carrier operations." [CNAP, 1988] The number of hours required to achieve the PMR is derived in the following manner. Fleet commanders and the office of CNO have

developed a syllabus for each type of tactical and anti-submarine warfare aircraft (this includes US Marine Corps air assets). Each syllabus contains a schedule of events and flight types (e.g., Carrier qualification practice landings, Air to Air practice missions, Air to Ground practice missions, Airborne Refueling practice) required for an average aircrew to achieve and maintain the desired level of readiness in the primary mission areas for their aircraft while in their operational squadron. [Lewis, February 1988] A training matrix for the Fighter (VF) community (F-14 aircraft) is presented in the Appendix. The accomplishment of all the required missions by the aircrew will give them a 100% PMR rating. The CNO has issued a PMR flight hour goal for TACAIR/ASW pilots of 25 hours per month or 300 hours per fiscal year or 450 hours per 18 month operational cycle in order to achieve that 100% rating. [OP-20, 1987, 1988]

1. CNAL and CNAP Reaction to Congressional Fiscal Policy

In 1987, the Department of the Navy had to address the fiscal restraints imposed by the Gramm-Rudman-Hollings Act. In an effort to deal with Congressional direction, CNO tasked the type commanders (CNAL and CNAP) to develop funding guidelines for TACAIR/ASW squadrons. [Lewis,1987] These guidelines were developed to accept the funding shortfalls for that year while maintaining a desired level of both dollars and flight hours for deployed squadrons.

The guidelines, depicted in Figure 2-1, represent the FY87 PMR levels programmed by the TYCOM's for fighter squadrons during a generic turn-around cycle after having received the budget for the year. Given that the cycle is 18 months long, any one squadron would be funded for only the 12 months of its cycle occurring in that fiscal year. This is important because the squadrons are susceptible to major changes in the number of flight hours they will receive during a cycle. A comparison of the level of PMR available to a squadrons in FY1987, FY1988 and FY1989 as shown in Figures 2-1, 2-2, and 2-3 reveals that except for the deployed portions, programmed flying hours allocated are different for the same phase in different fiscal years. For instance, a squadron that has just arrived home from cruise on September 30, 1987 would be looking forward to receiving funding for 30% PMR or 7.5 hours per month (25 hours * 0.3) per pilot for one month and 78% PMR (19.5 hours/pilot/month) for the following two months based on its cycle programmed for FY87. However, as indicated in Figure 2-2 the squadron was only funded at the 30% rate for two of those three months and was unfunded for the other, a reduction of 31.5 flight hours or a 68% reduction in its training opportunity for that quarter.

Changes to the annual budget can directly affect the number of flight hours flown by pilots in each squadron. Though the number of flight hours has remained the same for

```
    CNAP
*   stand-     turn-          work-ups          deployed
    down       around

**  30% /_____78%_____/_____105%_______/_______115%_______/

*** 1  2              7                 13                  19
```

```
    CNAL
                                NAS Fallon
*   stand-     turnaround and     / Battle Group    deployed
    down          workups         /  operations

**  25% /________85%_________/100%/_120%_/_____115%_______/

*** 1  2                    10.5  11      13              19
```

* the phase of the cycle
** the % of actual PMR funding for the squadron
*** the month during the cycle.

The CNAL cycle was presented to the author in a more rigid format than the CNAP cycle, with funding for the Fallon detachment set at a specific level.

Figure 2-1 CNAP/CNAL PMR Funding for FY1987

deployed squadrons at 115% of PMR, the TYCOMs are required to remain within the overall funding level for the community. The squadrons are therefore susceptible to flight hour allotment adjustments during all phases of their non-deployed status.

2. CNAL and CNAP Differences

Squadrons are also susceptible to different PMR funding levels because their geographic location. In Figure 2-1, the first month a squadron returned home from cruise, a CNAP squadron was funded at 30% of its PMR or approximately 7.5 hours per month per aircrew. A CNAL squadron was funded

for 25% of its PMR or 6.25 hours per month per aircrew. These differences in percentages of PMR funding reflect the different policies and needs of the Type Commanders on either coast. For example, a two-week, Airwing detachment to Naval Air Station Fallon, conducted by both TYCOM's was scheduled specifically during the tenth month of the cycle for the East coast squadrons, while West coast squadrons were more flexible in the planning of this training opportunity.

The cycle PMR rates for the 18 month models presented above are 96.6% for CNAP and 92.4% for CNAL. In other words, for the cycle, pilots would be programmed for 434.7 and 415.8 hours of flight time respectively. The loss of between 15 and 30 hours from the 450 hour goal is not evenly spread across the cycle. Both TYCOMs fund the six month deployment equally; the funding levels for the other twelve months of non-deployed flight status then become 87.5% for CNAP and 83.5% for CNAL (262.5 and 250.5 hours for the twelve non-deployed months instead of 300 hours).

The 100% PMR flight hour requirement of 25 hours per month for a TACAIR/ASW aviator when multiplied by the percentage of PMR actually funded in FY 1987 produced the following results. In terms of flight hours, the aircrew would receive an average of 21.9 hours per month in the Pacific fleet or 20.9 hours per month in the Atlantic fleet during their non-deployed months. For FY 1987, Navy wide,

the fighter aviators flew an average of 21.79 hours per month, including those deployed. [Hughes, 1988]

3. CNAP PMR Policy

CNAP

stand-down	turn-around	work-ups	deployed
0% /_30%_/__78%___/_____100%_____/_____115%_____/			
1 2	4	7 13	19

Figure 2-2 CNAP PMR Funding for FY1988

Because the deployed flying hour average exceeds 25 hours per month (it is programmed for 115% of 25 hours) the management problem for the rest of the program is more acute. Therefore, it is important to understand how the planning and funding for a squadron during the cycle is arranged in order to appreciate the impact of specific cuts in the PMR.

In Figure 2-2, the first month of the cycle is unfunded. The next two months are funded at 30% of the PMR, equating to 7.5 hours per aircrew per month for those two months. Given the squadrons are funded by the quarter, this means that the average aircrew will fly 5.0 hours per month of the first quarter of its cycle in FY1988. Presently, even during the unfunded months, the planes and aircrews do not stop flying. Maintenance requirements and the need for "Check hops" or quality assurance test flights remain. The

remainder of the schedules are computed similarly; if monthly changes occur, they can be spread across the appropriate quarter.

Projected levels for FY1989 are shown in Figure 2-3. At this point, the FY89 percentages are subject to the fluctuations that will arise due to the budgetary process and are only projections based upon available information.

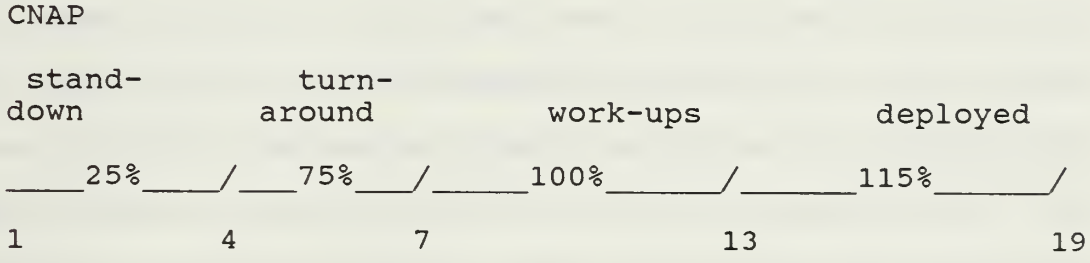


Figure 2-3 CNAP PMR Funding for FY1989 (Projected) [CNAP 019, 1988]

Actual squadron hours and funding are derived from the CNO Operations Plan 20 (OP 20) guidance in the following manner. Within the TACAIR/ASW program it is assumed that the cycle of any squadron can be reasonably determined through the use of the schedules presented. As each phase is given a percentage factor (derived from the OP-20 as shown in Figures 2-1, 2-2, 2-3) with which to modify the PMR, the following formula is used to determine the hour and dollar allocation for a particular squadron:

BA * PMR * Phase Factor

where BA equals the number of aircrew allowed [CNAP, 1988].

This number includes an Aircrew Manning Factor (AMF), a factor multiplied by the basic Crew/Seat ratio to arrive at the actual number of aircrew allowed per squadron. [OP-20, 1988] The AMF is a single number applied consistently to all aircraft TMS in the Navy's inventory. [McDonnell, March 1988] For instance, if the allowance for aircrew per aircraft were designed to be 1.25 and there were 12 aircraft per squadron, then the average squadron would have 15 aircrews. In the case of the F-14 that would equal 30 people as it is a two seat aircraft. However, the Navy has decided to man the squadrons at less than 100% of the recommended crew/seat ratio. A factor of .95 for example, is then multiplied by the crew/seat ratio (C/S R) and the resultant number, the "BA," is then deemed the 100% manning requirement for the squadron. It is the BA (0.95(C/S R)) which is multiplied by the PMR, and then the phase percentage (arrived at from the OP-20), in order to achieve the phase hour allotment per squadron of each squadron type. The aggregate of these hour requirements is then combined with the computed cost per hour to arrive at an overall funding figure by the TYCOM.

4. Cost Per Hour Computations and Their Use

The cost per hour data are derived from the squadrons' submission of the Budget OPTAR Report (BOR) which report obligations by fund code for each month. The BOR provides the following information:

1. Obligations for aircraft operations and maintenance;
2. Appropriate Aircraft Equipment Codes;
3. Number of operating aircraft assigned;
4. Total gallons of fuel consumed for the month;
5. Total flight hours flown for the month.

The type commanders then compile the data and submit them to CNO for preparation of the yearly budget for dollars, hours and expected costs per hour [CNAP, 1988]. The result, which emanates from the office of CNO, is the OP-20.

Once the total requirement is prepared, it is submitted to the office of the Comptroller of the Navy (NAVCOMPT). A NAVCOMPT budget analyst reviews it for defendability and justification. It then proceeds to the Office of the Secretary of Defense and is reviewed as part of the DoN budget. Throughout this process dollars and programs are adjusted and must be justified through the reclama process in order to prevent their loss. The resulting budgetary request goes to the Office of the President for submission, review and approval by Congress. When the funds work their way back to the Type Commanders,

they are compared to the requirements of the fleet; and the PMR percentages planned in the OP-20 for that fiscal year are adjusted accordingly. [McDonnell, May 1988]

5. The OP-20

OP-20's are published for a period covering the execution year, the POM year, and the following three planning years. The entire report can be expected to be revised at least three times during the year. The first iteration is in January, and is designated the Congressional Final. The second is produced in June, and is designated the POM OP-20. The third is produced in September and called the NAVCOMPT Final. Changes can appear in any of the five OP-20s during any of the three printings. The OP-20 is not considered stable until the Congressional Final is published for the execution year. [CNAP 019, 1988]

When the execution year's Congressional Final funding figures are made available they are compared to the funding plans of the Type Commanders. If necessary, adjustments are made to balance the flight hours planned to the available funds, or the unconstrained requirements are noted and additional funds are requested through the chain of command. [McDonnell, May 1988]

The planning document that is available for TACAIR/ASW is a schedule of the overall OP-20. This schedule includes all the tactical aircraft identified by TMS with the following information and computations: the number of

aircraft, the crew to seat ratios, the total number of crews, an Aircrew Manning Factor, the Required hours/crew/month, the Total Mission Requirements, the Total Mission Hours, the TMS cost per hour, the total costs required and budgeted, the resulting budgeted hours/ month/crew, and the percent of required hours funded. The following presents a detailed description of each block of information on the OP-20. A sample of the OP-20 is provided in Table 2-1.

1. TMS--the type, model and series of a designated aircraft.
2. Number of Aircraft--the total number of that TMS for the FY.
3. Crew Seat Ratio--Number of crews assigned to each aircraft.
4. Number of Crews--#2 * #3 (number of crews required)
5. AMF--the % of aircrews on board as budgeted by the OP-20.
6. Req. Hours/Crew/Month--PMR.
7. Total Mission Req. Hours--#4 * #6 * 12.
8. Total Hours--#7 * #5 (Total Hours Required).
9. Total Hours Budgeted--determined by OPNAV.
10. Cost per Hour--taken from the source OP-20.
11. Total Cost Req.--#8 * #10.
12. Total Cost Budgeted--#9 * #10.
13. Budgeted Hours/Month/Crew--#9/12/(#4 * #5).
14. % of Req. Hours Funded--#12/#11.

TABLE 2-1

SAMPLE OP-20

* 1 TMS	2 No. of Aircft	3 C/S R	4 No. of Aircrw	5 AMF	6 Req. H/C/M	7 Tot.Miss. Req. Hrs.
**F14A	100	1.25	125	.95	25	37500

* 8 Tot. Hrs. Required	9 Tot. Hrs Budgeted	10 CPH	11 Total Req.	12 Cost Bud.	13 Budgeted H/M/C	14 % of Req. Hrs. Fund
** 35725#	32063##	10	3572500	3206300	22.5	.89749

* Numbers above catagories correspond to block numbers in the text on page 21.

** Numbers found on this line are for illustration only. Any resemblance to actual figures is coincidental.

This number represents 125 aircrew * .95 * 12 months.

This number reflects block 8 with a theoretical 10% cut in funding.

By subtracting the amount found in block 14 of this OP-20, from 100%, the percentage of funding shortfall can be determined for each TMS.

C. SUMMARY

If dollars relate to readiness and the PMR is the average number of hours required to keep an average aircrew proficient in its primary mission area, then the percentage shortfall in funding should relate to a shortfall in the average aircrew's performance. This thesis explores the

concept of dollars and readiness and presents some alternatives for reducing the effect of present and future budgetary constraints in order to better manage the flight hour programs for fighter squadrons with the remaining resources.

This chapter described the process for funding the Aviation community and maintaining its level of readiness. The following chapters will explore the problems inherent in the present funding process and look at problems to be faced in the event of future financial cuts.

III. EFFECTIVENESS, EFFICIENCY AND SAFETY

This chapter focuses on the Flight Hour Program and effectiveness and efficiency measures that could be used to evaluate it. A discussion of effectiveness and efficiency is presented. The chapter also addresses the flight hours in relation to the Navy's safety records and pilot mishap trend data.

A. EFFICIENCY, EFFECTIVENESS AND COST

It is extremely difficult to define measures for determining the effectiveness of our nation's defense forces in peace time. One way is to accept that the forces are effective if the country faces no immediate threat to its physical security. "As the State Department might put it, the main military objective of the United States is to deter attacks on the nation's vital interests." [Kaufman,1986, p. 59] Likewise, it is difficult to determine its efficiency with any type of cost-benefit analysis since the benefits are difficult to define and measure. The measure of benefit for training and furnishing the forces with the most advanced equipment is best determined when the force is engaged in a combat situation.

1. Primary Mission(s) and Their Funding

The Navy must answer to efficiency experts and effectiveness evaluators in the government and in the media.

The PMRs and Flight Hour Programs have been able to provide a benchmark and a reporting and documentation system that demonstrate both effectiveness and efficiency. [Lewis, February 1988; McDonnell, February 1988] Squadrons are not single-mission oriented. The TYCOMs must address the problem of having squadrons which perform multiple "Primary Missions," complicating the managerial problem of providing financial resources to any primary mission area. It must be noted here that although the TYCOMs provide the funds to the squadron and set the training guidelines, it is the squadron commander who ultimately insures that his squadron meets all the requirements imposed by his TYCOM. It is ultimately the squadron commander whose decisions determine how and when to accomplish these requirements.

In the fighter community, "Primary Missions" include flying off, on, and around the carrier, extended range intercepts of hostile missiles or missile carrying bombers in an environment of electronic warfare, strike escort, engaging other, sometimes more maneuverable aircraft in a "dogfight" scenario, and conducting high-speed, low-level reconnaissance and photographic missions. During peacetime, accomplishing the "mission" equates to completing the required training or training mission.

Choices among programs and mission areas are made in response to changes in the funding levels. Since the amount of flying hours available to the Navy is finite, it can be

argued that in the present budgetary environment, cutbacks or complete deletion due to additional budgetary constraints will have to be made. Those making the choices will need to be able to identify not only the relative tactical importance of each training evolution but the cost of each one as well. In an interview, RAdm. J. Best stated that, "A prioritizing of functions is necessitated if the cut to funds is certain." [Best, 1988] At the present time, a cost per training mission data base does not exist. Different missions cost different dollar amounts. As cuts or increases in the budget are made, there are no data available to allocate resources among missions. Additionally, a mission cost system would provide to the operators, managers and the budgeteers a means to analyze the impact of the funding changes and provide a more detailed justification for funding requests.

2. Congressional Requirements

Points and Michelson (1984) describe the financial structure and procedures of the federal government as providing "information useful in assessing management's performance and stewardship." [Points and Michelson, 1984, p. 133] They delineate three specific areas where the assessments are directed; fiscal viability, fiscal compliance, and activity level. [Points and Michelson, 1984, p.134] These can be described as the ability to

maintain a requisite level of service within the law in a manner which is measurable in some way.

Kaufman points out that the Congressional Budget Office measures and assesses the military's management and stewardship, by examining four main determinants of defense capability: force structure, modernization, readiness, and sustainability. [Kaufman, 1986, p. 41]

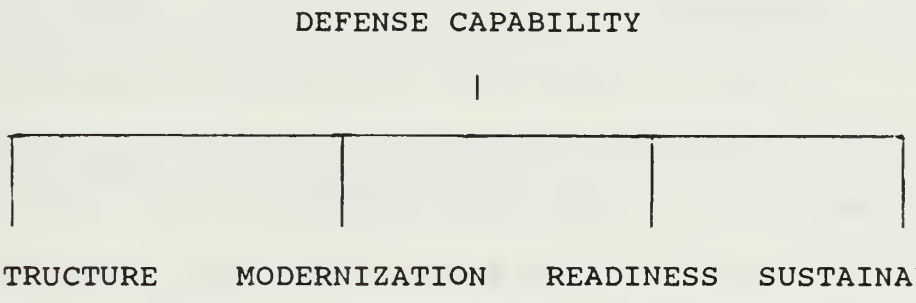


Figure 3-1 Determinants of Capability

The managers of the Navy's funds, including the Squadron Commanders who must determine how much and in what areas his pilots require training, are evaluated by their accomplishment of the determinants delineated by Kaufman within the areas of assessment described by Points and Michelson. Their performance, and subsequently, the Navy's, is measured by how efficiently they provide the requisite levels of effectiveness of the four determinants.

3. Measuring the Flight Hour Program

The cornerstone of all the Naval Air Force's operations, the Flight Hour Program provides the planners

and operators in the Navy with a system to provide the readiness input into the defense capability equation. As discussed previously, a question now facing the Navy is the adequacy of the Flight Hour Program. The question can be posed as follows: Should the program attempt to maximize the effectiveness of the force for a given cost or should it try to minimize the cost to maintain a given level of effectiveness?

4. The Best Measure, Effectiveness or Efficiency

A generic definition of effectiveness is the level at which a program produces an output to accomplish an intended effect. The PMR program has over the course of time arrived at a figure of 25 hours per pilot per month as an amount required to provide the output of an adequate and reasonable defense. As noted earlier, during a normal cycle of operation, a pilot will receive less than the 25 hours per month. A pilot presently is funded to receive 25 hours for a period just prior to his becoming operational (or for our purposes, deployed) and in excess of that when he is in the operational environment. This program of adjusting the PMR is recognized to cause fluctuations in a pilot's effectiveness. [Best, 1988] Also, it is understood that 100 percent rating across all programs at all times would be nearly impossible to achieve at any cost, as depicted in a typical cost to effectiveness graph (Figure 3-2). As the level of effectiveness gets closer to 100%, the cost of

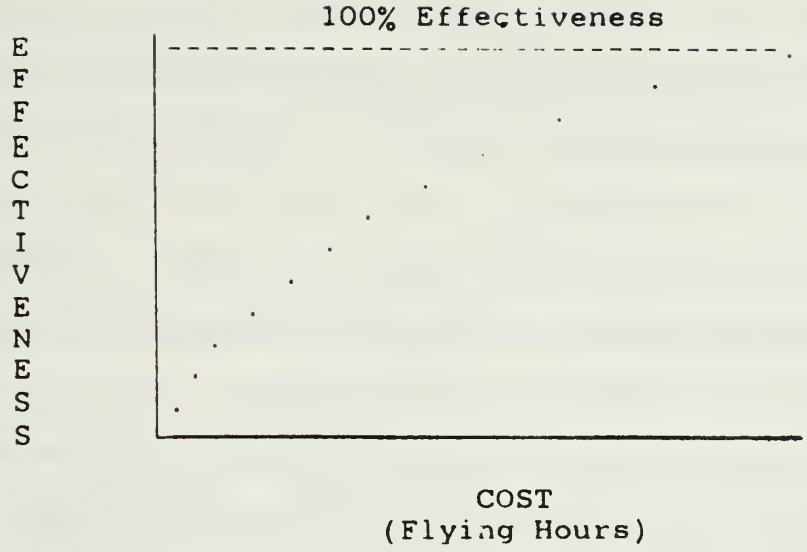


Figure 3-2 Generic Cost Effectiveness Graph
[Murray, 1986]

achieving that effectiveness rises at a much greater rate. In this case it would be because of the demands placed upon the pilot due to: (a) the number of different missions he is required to fly, (b) his ability to perform at a 100% rating in each of them, (c) the increased utilization of the airframe in highly stressful environments, and (d) the increased number of hours required to achieve higher performance rating levels. Additionally, pilot turnover and currency qualifications contribute to the implausibility of 100 percent mission readiness.

The efficiency question in military decisions is addressed at length by Hitch and McKean (1960). They point out that rather than using efficiency in the vague and

general sense of "making good use," a more precise definition would be an inability to produce one more unit of output without sacrificing another. [Hitch and McKean, 1960, p. 109]

It can be argued that both a concern for military economic efficiency and military effectiveness produce the same end result in our system of government.

> The Military services always (and properly) want more; the economizers always (and also properly) offer resistance, or try to impose reductions. But once the budget has been determined, there is no longer conflict of interest.
>
> In fact choices that maximize military capability for a given budget are the same choices that minimize the cost of attaining that capability. [Hitch and McKean, 1960, p. 124]

The result, therefore, is a budget which is considered by those who devise it, to be both efficient and effective.

5. <u>The Budget as a Given and Its Result</u>

For a Fighter Squadron executing the requirements for an effective fighter force, the budget is a relatively external constraint. Once the budget is decided upon, the Navy has to live within it, and although minor changes can be effected, the farther down the fiscal chain of command an organization is, the less chance that organization has of altering the funding levels. Therefore, the concern becomes making the program fit within the financial constraints set from above.

B. READINESS AND ITS MEASURE

1. Status of Resources and Training Systems

Of the four measures or determinants of defensive capability, the main area of concern in this paper is readiness. Of the numerous types of readiness reports prepared throughout the chain of command, the primary method for reporting unit level readiness is the Status of Resources and Training Systems (SORTS) report. [NWP 10-1-11A] This internal Department of Defense report contains the information used by the Joint Chiefs of Staff (JCS) to monitor the status of all military units. Readiness is reported in the form of a combat or "C" rating. These alphanumerics represent, in general terms, the ability of a particular unit to perform its wartime tasking by measuring its peacetime level of the following items: Personnel, Equipment and Supplies on board, Equipment Condition, and most importantly for this paper, Training. The training portion of the SORTS report is designed to examine whether a unit has fulfilled its training and turnaround program requirements and has attained its required mission readiness level. Individual crew training requirements are compared to their actual mission accomplishment rate and their qualification currency.

The following is a list of the ratings and their associated explanations:

C1 Fully Combat Ready

C2 Substantially Combat Ready

C3 Marginally Combat Ready

C4 Not Combat Ready

C5 Programmed Not Combat Ready.

The SORTS highlights potential problem areas in readiness and training for briefings and preparation of external reports by higher level organizations within the Department of Defense (such as CNO or JCS). Although it is not to be used as an external report, organizations down to the squadron level rely on it to accurately represent their level of readiness. [NWP 10-1-11A]

C. EFFECTIVENESS EFFICIENCY AND READINESS

Although the Flight Hour Program has provided the benchmark for determining the average effectiveness level of the pilots in the Navy and funding for the achievement of that level, hours alone may not be the best indicators of the effectiveness of a pilot.

1. Is Every Hour Like the Next?

As a case in point, a Fighter squadron may not let a pilot be a section leader until he has 500 hours. But a squadron commander also looks at the proficiency of the individual in question. How were the 500 hours achieved? How effective a section leader would he be with only 500 hours? The more important calculation would be the successful completion of mission areas such as Air to Air

gunnery, participation in a certain number of multi-plane intercepts and Air Combat Maneuvering (ACM, "dogfight") flights, and other mission areas in order to achieve the required degree of proficiency for such a rating. It is not just the fact that a pilot has 500 hours that qualifies him for section leader designation.

The same holds true for the Flight Hour Program. Hours alone may not be sufficient for setting funding allowances. As the fiscal constraints grow tighter and available funds dwindle, hard choices are going to have to be made. Cutting hours to save dollars will be a necessary requirement. The question now becomes, where? Where do those hours that are being deleted come from? What mission areas will maintain more of their original allotment? Which missions are more "Primary" than others?

At present, the Flight Hour Program and PMR are used to represent the requirements for funding calculations but do not reflect the nuances of each training mission in either cost per hour or relative tactical importance nor changes in Operations Tempo (OPTEMPO). These problems are addressed in the following chapters.

D. SAFETY CONSIDERATIONS

Between 1977 and 1985, aircraft mishaps in Naval Aviation cost the government 1.7 billion dollars. This does not include the related costs of things such as survivor's benefits, litigation brought against the Department of the

Navy, or the full replacement cost of the destroyed aircraft. There were 400 fatalities associated with those losses including 173 pilots [CNSC, 1986]. In 1986 the Navy lost another 71 aircraft and incurred 60 fatalities. In 1987, another 74 aircraft and 66 lives were lost. By June of 1988, 22 aircraft had been totally destroyed and another 20 had been severely damaged with 19 pilot and aircrew fatalities. The total dollar figure since the start of 1986 stands at over 1.4 billion dollars. [Aviation Weekly Safety Summary, January 1987, January 1988]

Every year, the Navy publishes its list of aircraft accidents, included in the list is the TMS of the aircraft, the severity of the damage to the airframes and the severity of injury to the aircrew. The Commander, Naval Safety Center (NSC) keeps an inventory of numerous factors contributing or suspected to have contributed to the accidents.

Studies conducted by the Naval Safety Center and published in APPROACH magazine associate flight hours with accident rates. High risk flight time categories for pilots are shown in Figure 3-1. Tables 3-1 and 3-2 represent the class A mishap rates as broken down by the categories in Figure 3-1. Class A mishaps represent those accidents in which the aircraft was lost or destroyed. A review of these tables will show that pilots tend to incur fewer mishaps the greater their experience.

CATEGORY	HOURS IN MODEL	TOTAL HOURS*
Fighters	<300	<750
Attack	<300	450 - 1500
Single Seat	<300	450 - 750
Dual Seat	<300	<750

* of flying in all types of aircraft

Source: [CNSC, 1986] (compiled from APPROACH issues of November, 1984 and January, 1985)

Figure 3-1 High Risk Window for Jet Aircraft Pilots

One of the areas studied by the Safety Center is the relationship between an individual's total and in-type flight hours and the percentage of accidents which occur in certain groupings of pilots both by mission and by blocks of flight hours. Although no definitive study has been conducted, the data from safety records continues to be compiled. Analysis of this data could provide information useful in highlighting safety problems with aircrew in various hour groups and mission areas.

The data in Tables 3-1 and 3-2 present evidence that the overall rate of pilot error mishaps decreases as the pilots acquire more flight experience. As budget cutbacks likely will effect not only a decrease in monthly flying hours, but the overall experience levels of career pilots, the relationship of these cuts to pilot safety must be considered.

TABLE 3-1

FIGHTER ACCIDENTS 77-85

HOURS IN MODEL

TOTAL PILOT HOURS	0-300	301-500	500-1000	1000 +	TOTAL
0 450	17 9.99	00 0.00	N.A.	N.A.	17 9.99
451-750	10 9.62	05 4.41	00 0.00	N.A.	15 6.75
751-1500	04 3.94	03 4.20	11 4.07	00 0.00	18 3.72
1500+	04 2.27	05 5.04	14 5.78	12 3.65	35 4.14
TOTAL	35 6.35	13 4.54	25 4.82	12 3.26	85 4.95

Class A Mishaps

*

**

Pilot Error Rate per 100,000 Flight Hours

This table shows that pilots with greater than 750 total flight hours and more than 300 hours in type have a lower accident rate than the population average. Although the data do not show a smooth decline in accident rates as a pilot in this category gains more hours, a decrease in the rate does occur between the initial hour blocks and the final ones.

Source: [CNSC, 1986, p. 9]

TABLE 3-2

DUAL SEAT TACAIR ACCIDENTS 77-85

HOURS IN MODEL

TOTAL PILOT HOURS	0-300	301-500	501-1000	1000 +	TOTAL
0-450	22 8.14	00 0.00	N.A.	N.A.	22 8.14
451-750	10 6.17	08 4.18	00 0.00	N.A.	18 4.97
751-1500	06 5.75	05 5.05	14 3.18	00 0.00	25 3.53
1500 +	05 2.85	06 4.71	19 5.29	15 2.50	45 3.57
TOTAL	43 6.04	19 4.50	33 4.08	15 2.26	110 4.22

Class A Mishaps

*

**

Pilot Error Mishap Rate per 100,000 Hrs.

This table shows that the error rate for pilots with over 750 total hours and over 500 hours in type is lower than the average for the population. Total pilot hours show a significant decrease in accident rate as the pilots cross over the 450 hour mark for total flight hours. The trend for hours in tyep shows a steady decrease in the accident rate.

Source: [CNSC, 1986, p. 12]

As the pilots fly fewer hours, the high vulnerability "windows" depicted in Figure 3-1 will extend over a longer portion of any one individual's career and expose that individual to higher risk for a greater amount of time. By stretching out the total number of hours individuals will fly, the familiarity of the pilots to their task environments will suffer. The maximum time a pilot should fly is not addressed in this thesis, as it is only concerned with the **minimum** level issue. There are limits to both ends of the flight hour spectrum however, and the Naval Aviation community recognizes this by setting maximum flight hour limits as well. For single-piloted aircraft, that limit is 65 hours per 30 days or 195 hours per 90 days. In order to legally exceed the maximum, a physical examination must be performed by a Flight Surgeon and a waiver granted. [OPNAV, July 1987]

Another result of reducing flight hours of aircrew is the reduction of the level of experience for Training Command (TRACOM) and FRS instructors if they are chosen from the same groups of post operational tour aircrew as they are now.

One important area to note is the finding that pilots in the initial portion of their first tour experience very high accident rates. Again one should note that these mishaps occur during the time generally when the pilot is in his peak vulnerability window. An extension of that window

will place the pilot into a vulnerable position for a longer portion of his first operational tour.

The results of the compiled data demonstrate a relationship between the number of flight hours flown and the number of mishaps. Specifically for Fighter/TACAIR Dual Seat (the general description of the F-14) squadrons pilot error rates were related to total hours. The rate decreased as pilots received more hours in model, particularly if their total number of flight hours were less than 750. These pilots were rated to have a high to extremely high accident rates in comparison to those with more specific model experience. [CNSC, 1986]

One interesting phenomenon which might occur due to a cutback in the number of flight hours is that the level of accidents both in terms of rate and severity may very well decrease due to the reactions of pilots experiencing fewer than normal flying hours. An argument can be made for this because of the increased attention to safety of flight items that could occur because of the decrease in familiarity with the flying environment. As the hours available go down and the level of experience of pilots decreases, attention must be paid to maintaining the level of realism in training which, if reduced, could cause dramatically negative results in the event of actual conflict. In an effort to get the most out of each flight, "training like you'll fight" is an age old adage which needs to be practiced as well as

preached. Squadron commanders must be even more acutely aware of the dangers facing their pilots due to decreased hours and structure their squadron training syllabi to not only reflect the requirements of the Training and Readiness syllabus but to ensure even more than before the aspects of safety in every flight. It is the responsibility of all concerned in the process to maintain the highest level of readiness possible, whatever the funding level. If due to the cut in funds, the readiness level might suffer, it is the responsibility of all concerned to minimize the damage caused by the funding cuts.

IV. OPERATORS, MANAGERS AND PROBLEMS DISCUSSED

Joshua Ronen (1975) discusses the function of budgets in decision making on the part of both superiors and subordinates in an organization. He states, "Viewed as a whole then, budgets constitute both constraints and opportunities." [Ronen, 1975] It can be argued that the present environment of a declining resource base provides the greatest budget constraints faced by Naval personnel and managers during the past decade. This chapter presents the results of interviews of Naval personnel concerning changes to the budget and managing the funds remaining for flight hours, flying, and simulators.

The chapter is divided into five sections. The first section presents a general discussion of the operational environment. The second section discusses the conduct of the interviews and a description of the overall response to issues discussed. The third section presents discussions of cost per hour computations, simulators, and safety and operational needs compiled from interviews with aircrew and CNAP personnel. The fourth section presents a set of topics specifically addressed by CNAP budgeting staff and planners during the course of their interviews, including a discussion of Permanent Change of Station problems. The

fifth section presents the results of discussions with senior Naval aircrew personnel.

A. THE MILITARY OPERATIONAL ENVIRONMENT DISCUSSED

It has often been pointed out by Department of Defense critics in the Congress that the cost of our technologically complex present day military hardware is extremely high. This is a result of the nation opting for a strategy of being technologically advanced than superior in numbers in relation to the opposition super-powers. The nation provides its forces with armaments that are on the leading edges of technology. [PBS,1988] For example, U.S. Air Forces in NATO are expected to achieve at least a four to one Kill Ratio just to stay even with their adversaries. [PBS, 1988] The F-14 is designed to carry a weapon system that can engage up to six targets at one time at long range. Implicit in such an approach to defense is the assumption that the hardware and the people operating it are expected to perform much better than their counterparts, and not just adequately. To ensure exceptional performance, training is necessary. Numerous articles, Change of Command speeches, and testimony before Congress and the nation's press have stressed the need for an aggressive flying program [Taylor, Spring 1988] and for the Armed Forces to train like they'll fight. [PBS, 1988]

B. THE CONDUCT OF THE INTERVIEWS

Taking the "train for fighting" view into consideration, 39 Naval Aviation personnel were interviewed to gain an understanding of how they might react to varying levels of budget cuts and resultant losses of monthly flight hours. A breakdown of these personnel by rank is presented in Table 4-1. Interviews of flight personnel other than Commanding Officers and more senior personnel were conducted at random but were not the result of a statistically random survey. The sample interviewed is a convenience sample. The sample was limited to Pacific Fleet personnel and Naval Aviation Safety School students.

Without hesitation, the immediate response of all concerned was that they would accept the cuts and continue on as best they could to operate the program with the resources available. However, decreasing monthly flight hours was seen as an inappropriate way to save the necessary dollars. Taken as a group, those interviewed felt that the present allocation of flight hours was barely sufficient to conduct adequate, and more importantly, realistic flight training. [Lewis, March 1988]

C. A REVIEW OF NAVAL AVIATION CONCERNS

1. Cost Per Hour or Costs Per Hour?

For aircrews to "train like they fight," they require an appropriate amount of flight hours. Identifying the cost per hour of flight is an important (possibly the

most important) factor in developing the budget for the Naval Air Forces. The budgeted cost per hour of flight results in the number of hours allotted to any particular squadron. Fluctuations or misstatement of the cost per hour provide an inappropriate number of hours.

At the present time, the Cost per Hour data are arrived at by dividing by type, the total number of hours flown for any one period into the total dollars spent for that period. This method can lead to misapportionment of funds. Differences occur in flight hours achieved by different squadrons on different coasts, and even different squadrons on the same coast. The different coast problem is explained by the different distances aircraft from each coast must fly to reach the same types of training ranges. [Lewis, January 1988] Different hours on the same coast occur because of numerous factors including OPTEMPO, cycle phase, mission type, refueling method, or amount of training in any one area that a Commander deems necessary for his pilots. As an example, a Squadron Commander may see the need for some of his pilots to complete more flights than normal in carrier landing practice (FCLP's), an extremely high fuel usage type of flying, while a second squadron spends a lot of time practicing high altitude, long range intercepts for Fleet Air Defense (FAD) scenarios. The latter squadron might use less fuel per hour and not put nearly the same amount of stress on the airframe as the

constant landings and take-offs required in FCLP's. These squadrons might spend the same amount of dollars, but the flight time accumulated by the second would be different and higher than that of the first. An inequitable split in flight hours occurs. This scenario is not designed to argue the relative merits of FCLP's and FAD flights but is presented to illustrate the need for more detailed cost per hour figures.

2. Mission Loading

An opinion voiced by over half of those interviewed was that additional missions are seemingly added to the mission loads without cost impact considerations. A corollary is that back-up, or temporary fixes to problems tend to become permanent mission design changes. As an example, more than half of the F-14 aircrew interviewed stated that the Tactical Air Reconnaissance Pod System (TARPS), which has been incorporated into the F-14 to back up the photographic capabilities of the RA 5C, RF 4 and RF 8, has now replaced them. This has not only increased the mission role, but has put a severe strain on the training program which is limited by the number of hours that any one pilot can practice any one mission area.

Additional training is required for pilots and aircrew who fly TARPS missions. Individuals must not only acquaint themselves with the mission, but in the case of the TARPS, experience the different handling characteristics of

the aircraft (due to hardware additions to the aircraft) before being required to do it in a hostile environment. A similar argument can be made for the addition of external fuel tanks to deployed squadron aircraft. [Lewis, March 1988]

Each of the interviewees stressed that it is not that they do not want to do the missions. Rather, they want their best effort at performing any mission to culminate in a favorable result. Some stated that even with 100 percent of their aircraft's PMR flight hour requirement accomplished, they still feel "'heavily tasked at some points of the mission.'" [Taylor, Spring 1988]

The interviewees' comments provide some indication of the more general observation that the single-mission dedicated aircraft for the Navy is becoming a thing of the past. With the planned development of multi-mission capable aircraft, a more definitive and tailored programming of flight hours will be required to maintain an adequate level of expertise in each TACAIR community.

3. Simulators

An opinion shared by all of the interviewees was that there is no training like actual experience. Discussions concerning Flight Trainers or simulators produced a mix of views that included both positive and negative comments (some within the same statement) such as: "It's a great aid, but it just doesn't fly like the real

thing" or "Great for procedures but no real pucker factor." A previous Safety Officer commented, "I love them, you can make all your mistakes there and live to learn from them." Senior and junior aviators alike demonstrated their concern for both the number and level of sophistication of the trainers with statements like: "I can't get enough time. They're booked solid," and, "There aren't enough of them and although they are pretty great, they could be even better if we'd spend some more money on them."

Both Admiral Best and Admiral Taylor noted that trainer utilization was at a maximum, given the amount of time required for maintenance and the funding constraints of their operation. They agreed that there is a need for additional simulators although they also acknowledge two important limitations inherent to the trainers. [Best, 1988; Taylor, May 1988] First, simulators are expensive. The development of hardware and software, the construction of the physical plant to house them, the associated cost to maintain the structures, and the personnel costs to run and maintain these systems all become issues of importance in the budget.

Second, simulators give an opportunity to practice procedure but do not, and never were intended to, replace the experience derived from actual flight. As a case in point, no matter how realistic the environmental factors are recreated in the machine, actual "G" force has not yet nor

probably ever will be truly simulated. Such limitations are the subject of on-going studies for increasing simulator realism to provide a more accurate "flying" experience. The aircrews interviewed did not feel that simulation could ever replace the experience gained from actual flight. It is for such reasons that the aircrew believed that simulators should not be considered as an equivalent replacement for the flight hours lost to budgetary cuts.

4. Safety and Operational Needs

One concern voiced by more than half of the 11 squadron Safety Officers interviewed was a fear that if flight hours per pilot were cut there would be a rise in the rate if not the actual number of accidents. A counter to that argument expressed by the others was that if pilots were experiencing a cut back in their familiarity with their aircraft, more thorough preflight planning would be conducted, flight safety would play a more important role in the entire evolution of a flight, and the accident rate would go down. During the first six months of CY88 the total number of accidents in the Navy has been lower than the CY87 Year to Date (22 accidents and a rate of 2.40 per 100,000 flight hours for 1988 versus 29 accidents and a rate of 3.11 per 100,000 flight hours for 1987). [Aviation Weekly Safety Summary, May 1988]

A majority of the Safety Officers interviewed agreed that pilots as a whole might raise their personal standards

for safety of flight that could result in individuals lowering their aggressiveness during training, and possibly causing higher attrition rates when called upon to perform in a hostile environment if the flight hours continued to be cut.

Examples of comments made by aviators concerning flight hour cutbacks and their effect on aggressiveness and training included the following:

1. "Guys would pull only five G's instead of six and a half."

2. "No one would press the edge of the envelope...the plane's or their own."

3. "It'd take a lot longer to get qualled to fight below 10,000 feet."

4. "How am I supposed to stay qualled if they give me less than what they said the minimum was in the first place?"

Admiral Taylor noted that, "...F-14 pilots did not average (even) 20 hours/month for the (past) year." [Taylor, Spring, 1988] A letter from a pilot in the Indian Ocean contained the following statement, "'...when the average hours/month drops below 25, the ability to employ our sophisticated machines declines rapidly. And the scary part is the relationship is not linear, especially below 20 hours per month.'" [Taylor, Spring 1988]

D. FLIGHT HOUR PROGRAM ISSUES ADDRESSED BY CNAP

During interviews with CNAP staff a number of issues were discussed. The majority of discussions centered on a

1987 point paper in which the Force Comptroller of CNAP outlined three specific areas of consideration for changes to the present Flight Hour Program. They are: (1) the introduction of OPTEMPO, (2) the elimination of the Aircrew Manning Factor, and (3) the decoupling of the TACAIR and ASW requirements for funding purposes. [Waggoner, 1987] A fourth area, the potential issues concerning Permanent Change of Station policy, was also addressed during the interviews.

The present method of funding is based on a combination of factors such as force level, number of crews required, the PMR, and the AMF, but this funding method does not accurately depict the actual requirements placed on the system. OPTEMPO, the first area mentioned above, is not included as a factor in the computations for the OP-20. In FY 1987, a 15 million dollar shortfall was experienced because of increased OPTEMPO for the Pacific Fleet forces. [Waggoner, February 1988]

The second planning factor discussed by the CNAP report, the Aircrew Manning Factor, was designed to provide a calculation method to properly reflect the number of aircrews budgeted per aircraft per squadron in the OP-20. For FY 1987 it was equal to 95.5%. The actual manning level for TACAIR overall, was 97.46%. [McDonnell, March 1988] Deployed squadrons were and are today manned at 100%. This exacerbates the gap between funding and manning. During the

period when squadrons are deployed, they are funded to reflect a 115% PMR flight hour rate, but they are also over-manned when the AMF is considered. The combination of funding and manning levels causes the number of flight hours flown per pilot to be less than the number of flight hours funded since there are more pilots than planned for in the squadron at that time. To achieve an overall manning level of 97.46%, squadrons during their standdown and turnaround cycles were permitted to drop below "combat ready" personnel levels.

The segments of the cycle when the squadrons attempt to offset the 100% manning level of deployment, and achieve the 95.5% overall rate occur during the low funded (through PMR percentage shortfalls) periods. [McDonnell, March 1988] However, they also coincide with the periods when a squadron is least likely to be called up for an emergency deployment. In any case, if a squadron were to drop below a 100% manning level while deployed, for whatever reason, the squadron would be augmented to a 100% manning level to insure that it would be able to meet all of its commitments.

The third planning factor discussed in the point paper is concerned with completely decoupling TACAIR from ASW requirements for funding purposes. The ideal funding level for TACAIR and ASW in the Flight Hour Program is set at 25 hours per crew per month. It is argued that this is not reflective of the ASW needs and that the 25 hour level is

relevant only for carrier based TAC AIR. [Waggoner, 1987] The OP 20 reflects the following numbers which provide for additional hour requirements for the respective aircraft:

VS (S3A aircraft)	32 hours
HS (H3 helicopters)	29 hours
HSL (H2, SH60 helicopters)	30 hours
VP (P3 aircraft)	52 hours

When funding is based on the Flight Hour Program, TACAIR assets are then drawn down to partially fund the ASW commitments, cutting further the funds available for TACAIR. One alternative would be to uncouple the two divisions of operational flying to more adequately reflect their OPTEMPO and their need for funds. The fourth area discussed, not addressed in the point paper, concerns Permanent Change of Station (PCS) issues. Although it is not part of flight hour funding, this aspect of manning can cause acute problems affecting personnel levels directly and flight hour utilization indirectly.

Due to the continued need for new pilots, the requirement for personnel rotation into operational tours, and the extension of personnel in their operational tours due to a lack of PCS funds, the manning levels of squadrons may exceed those prescribed by the funding available. This leads to an even greater gap in flight hours received by a pilot. For instance, if a squadron is budgeted for 20 hours per month per pilot, and that budget is for 10 pilots (from

calculations for AMF), and another pilot is brought on board, the 200 hours budgeted would now be split by 11 pilots or 18.18 hours per month per pilot. This would cause additional strain on the already taxed PMR guidelines. An alternative would then be to scrap the AMF computational figure and work from the actual manning figures of the squadrons.

E. SENIOR OFFICER DISCUSSIONS

In discussions with five current and former Commanding Officers, a scenario of an additional 10 percent cut in flight hour funding and their reaction to trying to make the program fit the hours was addressed. The consensus was that the program, as it is today, would have to be modified to fit the flight hour constraints. Given that such modifications might be needed, the question arose as to what method of time and dollar management they would use to provide the most effective utilization of the remaining flight hours. The following presents a review of their ideas and comments.

1. A Review of Specific Suggestions

A system which would break down the mission areas and cost out each type of mission would be an alternative to the one presently in place. This could be accomplished with the preparation of a data base for each type of flight through more precise post-flight documentation. Information included from each flight would be: its duration, its fuel cost and any associated post-flight maintenance costs. This

data base could be used to program funds and adjust training schedules in a more detailed manner. With the computerization of many of the administrative aspects of a squadron, a program could be devised to permit easy entry of the above data at a squadron level for computations conducted at higher levels in the chain of command. This system should also discriminate missions by a prioritization of mission area (i.e., basic qualification, advanced qualification, fleet operational support and other types of service support).

All of the current and former Commanding Officers interviewed agreed that a prioritized list of mission areas needs to be formulated for each TMS of aircraft in the Naval inventory. From this list a schedule of cost per training hour in each mission area should be developed. From these two sets of data, the number and duration of training missions for each TMS could be derived. Fuel loads could thus be predetermined and flights could be time limited.

The present use of "hot" refueling methods (where aircraft are refueled while their engines, or at least one engine, is on or "turning") could be totally eliminated, saving fuel used by the aircraft while refueling. However, additional fuel trucks would have to be purchased to make this a workable alternative at the Master Jet Bases such as NAS Miramar.

Aircrews with extensive carrier landing experience, for example with more than 299 "traps," could have their field practice requirements significantly reduced, unless extra flights were deemed necessary by the squadron Landing Signals Officers (LSO's).

Increase the pro-pay for LSO's. Have all squadron and Wing LSO's, while shore based during their turn-around cycles, stand a Field LSO watch. LSO's would be exempt from standing squadron duties in consideration for their inclusion in the Field LSO watch bill. The LSOs would grade each pilot on every night approach and landing.

"Ball calls" (an identifying call made to the LSO's when a pilot visually acquires the landing aid nicknamed the "meat ball" because of its appearance) could be modified around the field to include the squadron number. The grade would be immediately communicated to the pilot's duty officer through a phone patch or base station radio A copy of the grading comments would be made available the following morning, and debriefs of contested grades could be handled on a case by case basis. This would continue a spirit of good natured rivalry and might help to insure that each pilot would have a continual record of their performance to catch disturbing trends early. As a result, the number of flights flown dedicated to Carrier Landing Practice might be reduced, providing significant savings over the long run.

To make the dollars "stretch" across an entire cycle or fiscal year it was suggested that the squadrons follow the monthly breakdown of hours actually funded. For the months that are not funded, the squadrons would be grounded. There would be no option to fly. In this case the maintenance and ownership of the aircraft would be shared with the Fleet Replacement Squadron.

Another suggestion to making the dollars stretch was to ground each squadron for two months after their return from deployment. This would enable more intensive training to be conducted during the flight approved part of the cycle. Training plans would have to be revised to reflect the long layoff. However, Admiral Best stated that the increase in the remaining months flight hour allotments could be programmed to provide for more intense training to make up for any loss of skills. [Best, May 1988]

The last idea posed was the tailoring of fuel loads to the specific missions to be performed, rather than fueling every flight to the aircraft's maximum capacity. This idea has already been incorporated into squadrons' maintenance procedures whenever feasible. It needs to be recognized that in many instances, this is not feasible, for example, (a) when the flight length is not mission dependent but time dependent or (b) because of last minute changes to the flight or maintenance schedules.

F. SUMMARY

This chapter presented the views of many Naval Aviators, from newly designated pilots and Naval Flight Officers to Flag Rank Officers in the Aviation community. Observations, recommendations, methods for implementation and other suggestions for future study are presented in the following chapter.

V. CONCLUSIONS

A. GENERAL COMMENTS

This thesis has provided a discussion of the Navy's Flight Hour Program, how it is funded, and how fluctuations in that funding can impact Fighter Squadrons in the Pacific fleet. As of the time of this writing, the Pacific fleet as well as the rest of the Navy awaits notification of the degree of budgetary cuts it will face in the coming Fiscal Year. While awaiting news of next year's budget, the Comptroller and Operations Officers for CNAP continue to work with a budget that includes unfunded pay raises and an actual reduction in operating funds. [Waggoner, March 1988]

This thesis explores what might be done to improve the Flight Hour Program in order to more ably meet the budgeting challenge of the future. The object of this thesis is to stimulate future discussion and action on adjusting the flying proficiency system for the needs of the future to maintain readiness.

The thesis has attempted to show the effects of the past two years' budgets on flying hours for CNAP Fighter Squadrons. Additionally, areas discussed included Naval Aviation Safety, and an overview of fleet level flight effectiveness and efficiency measures. Comments and ideas

concerning the present system of maintaining the aviation community's combat proficiency also have been provided.

Since the early 1960's, the Navy and the Department of Defense have experienced major fluctuations in their funding. During the first half of the 1980's, the Navy in particular received a tremendous boost in its growth plan. This was due to a combination of factors which included: a strong "pro defense" President, a Congress which tended to agree with him, Secretaries of the Departments of Defense and the Navy who were extremely successful in presenting their case before the Congress, and the support of the general population. At the same time however, the role of the Navy was increased. It became a "three ocean Navy" committed to protecting the Nation's interests on at least three fronts simultaneously.

In 1986, a reduction in defense funding was experienced. With the passage of the Gramm-Rudman-Hollings Act and the projected budget cuts, military leaders are going to be faced with even greater economic decisions than they presently face.

As discussed in the thesis, the overall Navy funding plan will be developed at a higher level than individual Fighter Squadrons or even CNAP. The overall budget guidelines will place an external constraint on the system. CNAP's role will be the execution of a program of providing

the best level of aircrew proficiency and operational training within the given budget.

One method to make the Flight Hour Program fit would be to eliminate an equal portion of all mission areas. This however might not reflect the relative importance of one mission area to another. Individuals interviewed stressed the need to produce a list of priorities from which to establish a structured method for determining appropriate cuts to the program, should the need arise. A base from which no cuts could be accepted without a reduction in mission requirement was also cited as necessary.

B. OBSERVATIONS AND RECOMMENDATIONS

Based upon the archival data reviewed and the interviews conducted, the following recommendations are directed at the TYCOM and Squadron level. The evidence provided in this thesis does not prove either the efficiency or effectiveness of the following recommendations. However, each recommendation is based upon the knowledge of experienced aviators.

Before the first three recommendations are implemented, a detailed cost/benefit study should be conducted. The fourth recommendation specifically concerns a cost study of truck refueling aircraft. The fifth recommendation concerns the continuation and expansion of the program of tailoring fuel loads to specific needs.

1. Each TMS should have its own flight hour requirements recognized.

By recognizing each TMS individually, the Flight Hour program would more adequately reflect the nuances of each aircraft's mission. To do this properly each community should be required to initiate a data base which would include information such as cost per mission flight hour by mission type, cost of associated maintenance (including maintenance support flights) per mission type for each flight, the number of missions of each mission type flown per year by coast (in order to recognize the different needs of the TYCOMs), and a record of the Combat effectiveness ratings for each squadron (including time). Mission codes provided on reporting documents ("Yellow Sheets") need to be mission specific and should include codes for performing multiple missions on any one flight. The subsequent division of flight time could be maintained by the Operations departments of the individual squadrons and included in the BORs or SORTS reports. This should provide a more accurate method of determining the costs for performing each mission.

2. A prioritized list of training missions for each TMS should be developed.

This list should be developed through the cooperation of Squadron Commanders, Fleet Replacement Squadron representatives, senior Naval aircrew, Naval Fighter Weapons School representatives, and the staffs of the Wing Commanders, Type Commanders and the Office of the Deputy Chief of Naval Operations (Air Warfare). These listings

would be different than the current training matrices. The listings would be produced in conjunction with the cost information provided according to the previous recommendation. The new matrices could provide a guideline for mission training changes or could assist in making specific level of cutbacks in each mission area depending on the severity of the budgetary reduction.

3. Establish a program for LSOs to grade night field approaches, touch and goes, and landings.

Time spent in the landing pattern would be more effectively used if the pilots were under the external supervision of an LSO. Each approach and landing would be a more valuable experience because it would be conducted under the guidance of an objective observer. The LSOs should receive additional compensation and be placed on a rotational Watch Bill as outlined in the thesis.

4. The efficiency of "Cold" or truck refueling of aircraft should be examined.

This examination should include the costs of obtaining the new refueling trucks and associated hardware, the personnel requirements and costs, and the reliance on another source of funds for its successful implementation and operation.

5. The tailoring of fuel loads to specific mission requirements.

This tailoring of fuel needs to be continued and if possible increased. Taking deployed and operational commitments into consideration, alternate methods of fuel

loading might be explored. One example is to "Hot" refuel the aircraft after start-up procedures, prior to calling for take-off instructions, this method might provide cost beneficial results.

C. SUGGESTIONS FOR FURTHER RESEARCH

In addition to the issues raised in the previous section, the following topics that might be researched but which were beyond the scope of this thesis were identified:

1. Would relating maintenance and support costs (AVDLR) to operational tempo or measurement factors through other than an average Cost per Hour provide a more accurate method of determining funding in this associated funding area?

2. Is union of the operations cycle to the funding cycle feasible? Would this provide a more stable financial base from the standpoint that the two cycles would then be consistent by either letting the funding process conform to the operational cycle, or adjusting the operations cycle to the budget?

3. What would be the effect of grounding squadrons for two months after their return from cruise? Is it feasible to ground them in certain mission areas during specific portions of their cycles? This research could include development of a plan for personnel utilization.

4. What is the relationship between flight hours, safety, and mission readiness? Could specific squadrons have their flight hours regulated in different mission areas to test the mission readiness?

5. Do the criteria for the Battle Efficiency Awards account for the funding differences experienced by squadrons because of the funding-operational cycle variations? Are Commanding Officers and their squadrons penalized by funding changes which could affect their Combat Effectiveness rating?

APPENDIX

THE FIGHTER TRAINING MATRIX

The following matrix presents a training schedule for a typical F-14 squadron in CNAP. An explanation of the matrix is provided below.

All training events should be completed during the appropriate periods in order to maintain a 100% Combat ready status. Points are assigned to various missions and crews are graded on their completion of the requirements. Within the matrix are specific requirements for certain flights. These requirements are found in various publications maintained by the squadron or the Air Wing. Successful completion of those requirements is mandatory for a 100% rating.

Some specific guidelines follow. ACM I through STK should be completed in order. CAP I through CAP/EW VII and STK may be completed at night. MAS flights should be completed in order. Simulators may be used to complete MAS requirements. Fleet Fighter Refresher Training satisfies all ACM and up to CAP IV. Credit for FCLP flights is granted if CARRIER Qualification is current.

FIGHTER TRAINING MATRIX

TRAINING EVENT	QUALIFICATION	CURRENCY REQUIREMENT	PERIOD
ACM I	FOUR 1V1 SIM./DISIM.	TWO OF THE SAME	Q +45D
ACM II	TWO 2V2 VIS. FLTS.	ONE OF THE SAME	Q +45D
CAP I	TWO 2V UNK. FLTS.	SAME	Q +45D
CAP/ ECM II	FOUR 2V UNK. FLTS. (RDR OR COMM ECM)	TWO OF THE SAME ECM FLTS.	Q +45D
CAP III	FOUR 2V UNK. FWD.QTR.	TWO OF THE SAME	Q +45D
CAP IV	TWO 4V UNK. FLTS.	SAME	Q +45D
CAP/ ECM V	FOUR 4V UNK. FLTS.	TWO OF THE SAME	Q +45D
CAP VI	FOUR 4V UNK. FWD.QTR.	TWO OF THE SAME	Q +45D
CAP/EW VII	FOUR 2V UNK. ON EW RNG.	TWO OF THE SAME	Q +45D
CAP/EW VIII	FOUR 4V UNK. ON EW RNG.	TWO OF THE SAME	Q +45D
LAT I	FOUR SECTION LOW ALT. TRNG (MAY BE OPPOSED)	TWO OF THE SAME	Q +45D
STK/ECM/ EW/OPDEC	TWO OPPOSED OVRLND COORD. STK. W/RDR OR COMM ECM	SAME	Q +45D
MF I	FIRE ONE RDR MISSILE	SAME	Q +36M
MF II	FIRE ONE IR MISSILE	SAME	Q +36M
AAG I	ONE GUNNERY (AA) FLT.	SAME	Q +3M
AAG II	ONE GUNNERY V MANEUV.DART	SAME	Q +3M
SAR/CAS I	SECT. FIRE/NO FIRE RESCAP	SAME	Q +6M
MAS/ECM I	SIM. OR FLT.	SAME	Q +45D
MAS/ECM II	SIM. OR FLT.	SAME	Q +45D
MAS/ECM III	SIM. OR FLT.	SAME	Q +45D

TRAINING EVENT	QUALIFICATION	CURRENCY REQUIREMENT	PERIOD
MAS/ECM IV	SIM. OR FLT.	SAME	Q +45
EMCON/ OPSEC I	ONE FLT.	SAME	Q +6M
SSC I	ONE FLT.	SAME	Q +12
AR I	SIX DAY PLUGS	SAME	Q +2M
AR II	SIX NIGHT PLUGS	SAME	Q +2M
NATOPS CHECK	SIM. OR FLT.	SAME	ANNUAL
INST. CHECK	SIM. OR FLT.	SAME	ANNUAL
FCLP/ ACLS	IAW LSO NATOPS	SAME	VARIES
CARR QUALS	IAW LSO NATOPS	SAME	VARIES
RECCE I	THREE LOW ALT OR FRS TARPS SYLLABUS	TWO LOW ALT OR TARPS	Q +2M
RECCE II	TWO STAND OFF TARPS	SAME	Q +2M
RECCE III	ONE MAPPING TARPS	SAME	Q +5M
RECCE IV	ONE STK RECCE	SAME	Q +3M
RECCE V	TWO NIGHT IR RECCE	SAME	Q +2M
RECCE VI	TRAEX	SAME	Q +2M
RECCE VII	ONE DAY SSC TARPS	SAME	Q +3M
RECCE VIII	ONE NIGHT SSC	SAME	Q +2M

Source: [CNAP, 1988]

LIST OF REFERENCES

"Attack Aircraft Class A F/FRM Rates vs. Pilot Experience CY 77-83," Approach Magazine, November 1984.

Chief of Naval Operations, Operations Plan 20, September 1986.

Chief of Naval Operations, Operations Plan 20, June 1987.

Chief of Naval Operations, Operations Plan 20, September 1987.

Chief of Naval Operations, Operations Plan 20, January 1988.

Chief of Naval Operations, OPNAV Instruction 3710.7M, July 1987.

Commander Naval Air Forces Pacific Fleet, "The CNAP Flight Hour Program," 1988.

Commander, Naval Air Forces Pacific Fleet Code 019, "OP-20 Guide," 1987.

Commander, Naval Safety Center, "Gramm/Rudman/Hollings and Naval Mishap Potential," 1986.

Department of the Navy, Naval Weapons Publication 10-1-11.

"Fighter Aircraft Class A F/FRM Rates vs. Pilot Experience CY 77-83," Approach Magazine, January 1985.

Hitch, C.J. and McKean, R.N., The Economics of Defense in the Nuclear Age, Atheneum, 1987.

Interview between J.R. Best, Rear Admiral, USN, Commander, Fighter Airborne Early Warning Wings Pacific Fleet, Naval Air Station Miramar, San Diego, CA, and the author, 26 May 1988.

Interviews between D.T. Waggoner, Captain, USN, Code 019, Commander Naval Air Forces Pacific Fleet, Naval Air Station North Island, San Diego, CA, and the author, 17 February, 16, 18 March, 1988.

Interviews between C. Lewis, Lieutenant Commander, USN, Commander Naval Air Forces Pacific Fleet, Naval Air Station North Island, San Diego, CA, and the author, 10, 12 February 1988, 16 March, 1988.

Interviews between A. McDonnell, Lieutenant, USN, Commander Naval Air Forces Pacific Fleet, Naval Air Station North Island, San Diego, CA, and the author, 10 February, 1988, 16 March, 1988, 25 May, 1988.

Kaufman, W.W., A Reasonable Defense, The Brookings Institution, 1986.

Lewis, C., Flight Hour Program, point paper, 1987.

Lewis, C., Flight Hour Program, point paper presented to Commander Naval Air Forces Pacific Fleet, January 1988.

Mills, G.B. and Palmer, J.L., The Deficit Dilemma, Budget Policy in the Reagan Era, The Urban Institute Press, 1983.

Murray, N.M., The Marine Corps Flying Hour Program, Master's Thesis, Naval Postgraduate School, Monterey, CA, June 1986.

Naval Safety Center, Naval Aviation Weekly Safety Summary, No. 87-02, p. 3, January, 1987.

Naval Safety Center, Naval Aviation Weekly Safety Summary, No. 88-02, p. 3, January, 1988.

Naval Safety Center, Naval Aviation Weekly Safety Summary, No. 88-21, p. 2, May, 1988.

Practical Comptrollership Manual, 1987, Naval Postgraduate School, Monterey, CA.

Public Broadcasting Stations, Frontline, KQED, San Francisco, CA, May, 1988.

Ronen, J., "Budgets as Tools of Control and Motivation," in Managerial Accounting: The Behavioral Foundations, ed. J.L. Livingston, Grid, Inc., 1975.

Taylor, J.D., "Flying Hours and Fighting Spirit," The Hook, V. 16, No. 1, p. 2, Spring 1988.

Telephone conversation between Flag Aide to J.D. Taylor, Rear Admiral, USN, Commander, Light Attack Wing One, Naval Air Station Lemoore, Lemoore, CA, and the author, 25 May, 1988.

Telephone conversation between Hughes, K.E., II, Captain, USN, Special Assistant for Flying Hour Programs, Deputy Chief of Naval Operations (Air Warfare), Washington, D.C. and the author, 14 June 1988.

Telephone conversation between A. McDonnell, Lieutenant, USN, Office of Force Comptroller, Commander Naval Air Forces Pacific Fleet, Naval Air Station North Island, San Diego, CA, 2 June, 1988.

Waggoner, D.T., Flight Hour Program, point paper presented to Commander Naval Air Forces Pacific Fleet, Naval Air Station North Island, San Diego, CA, 14 March, 1987.

BIBLIOGRAPHY

Collender, S.E., The New Guide to the Federal Budget Fiscal Year 1987 Plus the Gramm-Rudman Budget Process, The Urban Institute Press, 1986.

Congressional Budget Office, Congress of the United States, Reducing the Deficit: Spending and Revenue Options, March 1986.

Executive Office of the President, Office of Management and Budget, Management of the United States Government, 1987.

Executive Office of the President, Office of Management and Budget, Mid Session Review of the 1988 Budget, 25 August 1987.

Hyde, A.C. and Shafritz, J.M., Government Budgeting: Theory, Process, Politics, Moore Publishing Company, Inc., 1978.

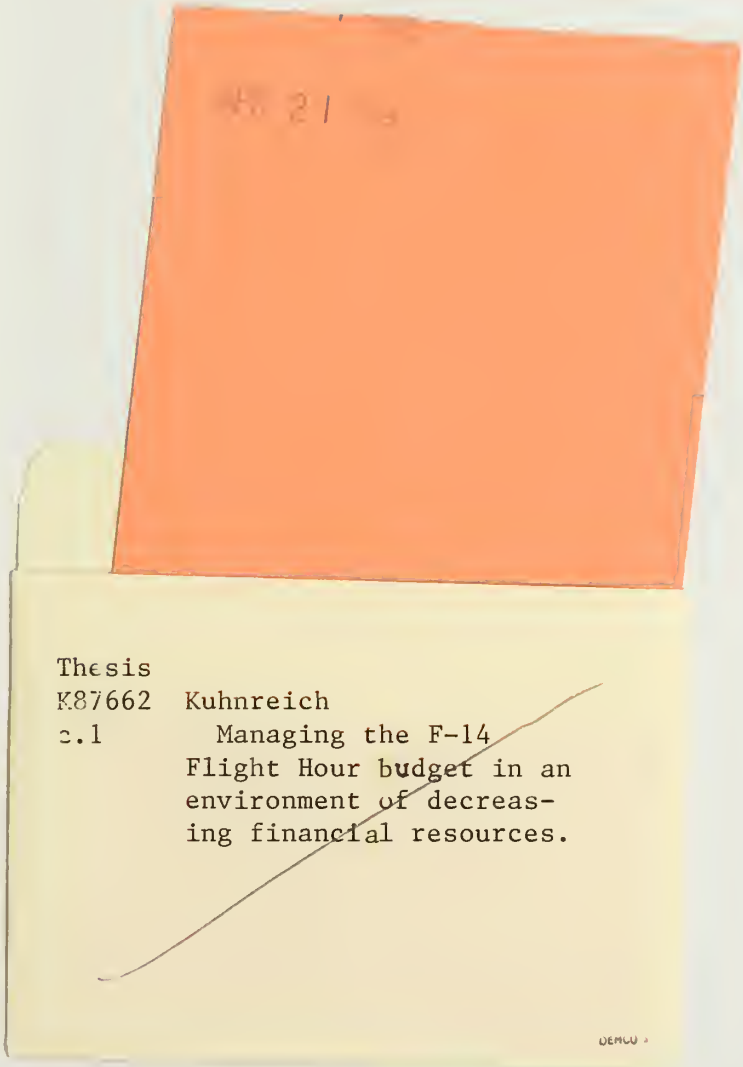
Interview between J.E. Jackson, Commander, S.C., USN, Curricular Officer, Department of Administrative Sciences, Naval Postgraduate School, Monterey, CA, and the author, 27 June 1988.

Telephone conversation between R.W. Walker, Commander, USN, Assistant Flying Hour Program Coordinator, Deputy Chief of Naval Operations (Air Warfare), and the author, Naval Air Station North Island, San Diego, CA, 4 May 1988.

INITIAL DISTRIBUTION LIST

	No. Copies
1. Rear Admiral J. Red Best Commander, Fighter Airborne Early Warning Wings Pacific Fleet Naval Air Station Miramar San Diego, California 92145	1
2. Rear Admiral J.D. Taylor Commander, Light Attack Wing Pacific Fleet Naval Air Station Lemoore Lemoore, California 93246-5022	1
3. Captain D.T. Waggoner Force Comptroller Commander Naval Air Force Pacific Fleet (Code 019) Naval Air Station North Island San Diego, California 92135-5100	1
4. Captain K.E. Hughes II Special Assistant for Flying Hour Programs Deputy Chief of Naval Operations (Air Warfare) (NOP-05E) Washington, D.C. 20390	1
5. Defense Technical Information Center Cameron Station Alexandria, Virginia 22304-6145	2
6. Library, Code 0142 Naval Postgraduate School Monterey, California 93943-5002	2
7. Professor Kenneth J. Euske, Code 54Ee Department of Administrative Sciences Naval Postgraduate School Monterey, California 93943-5000	2
8. Lieutenant Commander J.C. Kuhnreich Fighter Squadron One Hundred Twenty-Four Naval Air Sation Miramar San Diego, California 92145	1

9. Commander Larry Coppotelli 1
Aviation Safety School
Naval Postgraduate School
Monterey, California 93943-5000


Thesis
K87662 Kuhnreich
c.1 Managing the F-14
Flight Hour budget in an
environment of decreas-
ing financial resources.

DEMCO

Managing the F-14 Flight Hour budget in

3 2768 000 84644 8
DUDLEY KNOX LIBRARY